iKNOWLEDGE

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PRACTICES

Rapid Prototyping
by Kern Witcher

Rapid Prototyping is a viable approach to product development on projects and initiatives whose success depends on a significant amount of customer input. The customer is allowed to look, touch, and feel the product prior to final development and manufacturing. Rapid Prototyping is also useful in situations where requirements are difficult to describe. Product prototypes can be developed on an incremental basis and tested against the requirements prior to building the final configuration. This is an approach that works especially well in developing software tools that have Man-Machine interfaces. Overall, Rapid Prototyping provides quality and timely customer feedback, mitigates requirements "creep," causes fewer changes to the final design, and results in higher quality end products at less cost.

Procedures

1. Define customer or end user.

2. Assemble the customer, designers and developers into an Integrated Product Development Team. Note that some members of the team may require training.

3. Develop as a team the preliminary set of requirements.

4. Baseline the requirements. This will provide traceability and configuration management.

5. Develop an initial prototype that provides the look and feel for customer feedback.

6. Incorporate comments and develop the next version of the prototype.

7. Develop another version of the product by adding functionality. The designer and product development team also benefit from the availability of the prototype.

8. Incorporate comments and develop the next version of the prototype.

9. Develop a final version of the product by adding functionality.

10. Place final version under configuration control.

Some helpful hints for Rapid Prototypers

• Conduct market surveys in parallel with prototype development to assess if COTS components or products are able to satisfy the requirements.

• Encourage the team to "Think Outside the Box."

• Accept that some features of the prototype will not be used in the final version.

• Don't baseline the final configuration until customer requirements have been met.

Rapid Prototyping in Action
by Matthew Zimmerman
Armament Research, Development and Engineering Center

To stay on contract schedule, we needed an effective way to produce a prototype for a satellite-based weapons system our Integrated Product Team was developing. To address the issue, our designers created 2-D and 3-D Computer Aided Drawings of the concept, thus producing a virtual prototype. This was helpful, but still it offered no physical means to understand how the concept would function in reality. By using a sterolithography rapid prototyping system, the Integrated Product Team was able to take a step from the virtual prototype to a physical one in a matter of hours. Stereolithography produces three-dimensional parts from CAD drawings without the use of tooling, milling, or molding. The process uses a computer controlled laser beam to draw cross sections of an object on a liquid polymer forming a solid plastic model. With this physical prototype now to work from, we were better able to understand what we needed to do to bring the concept off the drawing pad into a physical reality. We were also better able to explain to our customer how the weapon system was going to function. We were able to accomplish all this and stay on contract schedule.

For a complete description, see Project Management Success Stories: Lessons of Project Leaders, Laufer and Hoffman, John Wiley & Sons, Inc, pp. 30-31.

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